WHAT IS CLAIMED IS:

1. A method for interpolating a desired color at a current pixel in a color image, the current pixel having a current color, comprising:

computing an interpolation of the desired color at the current pixel using the desired color;

computing a correction term using the current color; and

linearly combining the interpolation and the correction term to obtain a corrected interpolation of the desired color at the current pixel.

2. The method as set forth in claim 1, further comprising using neighboring pixels of the desired color in computing the interpolation.

3. The method as set forth in claim 1, further comprising using the current pixel in computing the correction term.

4. The method as set forth in claim 3, further comprising using neighboring pixels of the current color in computing the correction term.

5. The method as set forth in claim 1, wherein the interpolation is a bilinear interpolation technique.

6. The method as set forth in claim 1, wherein the correction term is a gradient correction.

7. The method as set forth in claim 6, further comprising applying a gradient-correction gain to the gradient correction to determine the amount of the gradient correction linearly combined with the interpolation.

8. The method as set forth in claim 1, further comprising adding the interpolation and the correction term to obtain a corrected interpolation.

9. A computer-implemented method for interpolating a desired color at a current pixel in an image sensor, the current pixel having a first color, comprising:

computing a first interpolation of the desired color at the current pixel using pixels having the desired color;

computing a gradient correction using pixels having the first color; and

linearly combining the first interpolation and the gradient correction to obtain a gradient-corrected interpolation of the desired color at the current pixel.

10. The computer-implemented method of claim 9, further comprising applying a gradient-correction gain to the gradient correction to affect the amount of the gradient correction that is linearly combined with the first interpolation.

11. The computer-implemented method of claim 10, further comprising selecting the gradient-correction gain such that a mean-squared error is minimized to produce an optimal gradient-correction gain.

12. The computer-implemented method of claim 11, further comprising adjusting the optimal gradient-correction gain to produce a simplified gradient-correction gain that allows computations using at least one of: (a) integer arithmetic; (b) no division operations.

13. The computer-implemented method of claim 9, wherein the first interpolation is a linear interpolation.

14. The computer-implemented method of claim 13, wherein the linear interpolation is a bilinear interpolation.

15. The computer-implemented method of claim 9, wherein the first interpolation is at least one of: (a) a bilinear interpolation; (b) a bi-cubic interpolation; (c) a Lanczos interpolation.

16. The computer-implemented method of claim 9, further comprising:

defining a region of support as a size of a pixel neighborhood whose values are considered for computation associated with any given pixel;

selecting the region of support to include pixels nearest the current pixel having the first color; and

using the region of support to compute the first interpolation and the gradient correction.

17. The computer-implemented method of claim 16, wherein the region of support is a 5x5 pixel region centered at the current pixel.

18. The computer-implemented method of claim 16, wherein the region of support is greater than a 5x5 pixel region centered at the current pixel.

19. The computer-implemented method of claim 18, wherein the first interpolation is a nonlinear interpolation.

20. The computer-implemented method of claim 16, further comprising:

using a first region of support to compute the first interpolation; and

using a second region of support to compute the gradient correction.

21. The computer-implemented method of claim 20, wherein the first region of support is different from the second region of support.

22. A computer-readable medium having computer-executable instructions for performing the computer-implemented method recited in claim 9.

23. A method for interpolating missing red-blue-green (RGB) data at a current pixel having a current color in a color image sensor, comprising:

using a first interpolation technique based on a missing color at the current pixel to determine a missing color estimate;

calculating a gradient correction based on the current color;

multiplying the gradient correction by a gradient-correction gain to obtain an adjusted gradient correction; and

combining in a linear manner the missing color estimate and the adjusted gradient correction to obtain a linearly corrected missing color estimate corresponding to at least some of the missing RGB data.

24. The method of claim 23, wherein the first interpolation technique is a bilinear interpolation.

25. The method of claim 23, wherein the gradient correction is a linear operator.

26. The method of claim 23, further comprising adjusting the gradient-correction gain based on characteristics of the color image sensor.

27. The method of claim 26, wherein the color image sensor is integrated into a digital camera system, and further comprising adjusting the gradient-correction gain based on characteristics of the digital camera system.

28. A process for linearly interpolating a missing color of a present pixel within a color image produced by a digital camera system having an image sensor, the present pixel having a first color, the process comprising:

defining a first region of support centered at the present pixel;

interpolating the missing color using an interpolation technique to obtain a first missing color estimation, the interpolation technique using pixels within the first region of support having the missing color;

defining a second region of support centered at the present pixel;

calculating a gradient correction using the present pixel and pixels within the second region of support having the first color;

applying a gradient-correction gain to the gradient correction that represents a percentage of the gradient correction to be used; and

linearly combining the first missing color estimation and the gradient correction to obtain a gradient-corrected estimation of the missing color.

29. The process as set forth in claim 28, further comprising varying the gradient-correction gain based on statistics of the color image.

30. The process as set forth in claim 29, further comprising:
measuring global statistics for the color image; and
varying the gradient-correction gain based on the global statistics.

31. The process as set forth in claim 29, further comprising:
measuring local statistics for each region in the color image; and
varying the gradient-correction gain based on the local statistics.

32. The process as set forth in claim 28, further comprising computing the gradient-correction gain based on the missing color.

33. The process as set forth in claim 32, wherein the missing color is green, and further comprising setting the gradient-correction gain to a value of ½.

34. The process as set forth in claim 32, wherein the missing color is red, and further comprising setting the gradient-correction gain to a value of 5/8.

35. The process as set forth in claim 32, wherein the missing color is blue, and further comprising setting the gradient-correction gain to a value of 3/4.

36. The process as set forth in claim 28, wherein the first and second regions of support are a 5x5 matrix of pixels.

37. A gradient-corrected linear interpolation system for interpolating a missing color value at a given pixel in a color image, the given pixel having a current color, comprising:

an interpolation module that computes an interpolation of the missing color value;

a correction term computation module that computes a correction term for the interpolation; and

a linear combination module that linearly combines the interpolation and correction term to produce a corrected interpolation for the missing color value at the given pixel.

38. The gradient-corrected linear interpolation system as set forth in claim 37, wherein the correction term computation module further comprises a region of support module that selects a size of a region of support around the given pixel centered at the given pixel.

39. The gradient-corrected linear interpolation system as set forth in claim 37, wherein the correction term computation module further comprises a gradient-correction selector that selects the amount of correction that will be linearly combined with the interpolation.

40. The gradient-corrected linear interpolation system as set forth in claim 37, wherein the correction term computation module further comprises a

gradient correction module that computes a gradient correction using the given pixel and pixels in a region of support having the current color.

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